TH

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,985	10/24/2003	Peter Wayte	126987/11915 (21635-0112)	1740

31450 7590 08/17/2007
MCNEES WALLACE & NURICK LLC
100 PINE STREET
P.O. BOX 1166
HARRISBURG, PA 17108-1166

EXAMINER	
ROE, JESSEE RANDALL	

ART UNIT	PAPER NUMBER
1742	

MAIL DATE	DELIVERY MODE
08/17/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/692,985	WAYTE ET AL.	
	Examiner	Art Unit	
	Jessee Roe	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18,21 and 22* is/are pending in the application.

4a) Of the above claim(s) *2 and 11* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-10, 12-18 and 21-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Previous Rejections

This Office action is written in response to the Appeal Brief filed 4 June 2007. The Examiner has reconsidered the rejections of the last Office action and has found the Applicant's arguments persuasive. Therefore, the finality of that action is withdrawn. Rejection based on the newly cited reference(s) follow.

Status of the Claims

Claims 1-18, and 21-22 are pending wherein claims 19-20 are canceled and claims 2 and 11 are withdrawn from consideration.

Examiner Interpretation

The Examiner interprets the recitation "a titanium alloy having a nominal composition in weight percent of 6 percent aluminum, 4 weight percent vanadium, 0.2 weight percent oxygen, balance titanium and impurities" as a titanium alloy containing in weight percent of 6 weight percent aluminum, 4 weight percent vanadium, 0.2 weight percent oxygen, balance titanium and impurities.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1, 3-5, 10, 12-14, and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239).

In regards to claims 1, 10, 21 and 22, Chakrabarti et al. ('624) disclose a method for fabricating a forged titanium alloy article to make gas turbine engine impellers and other gas turbine parts (col. 1, lines 11-34). The titanium alloy article would contain 5.5 to 6.75 weight percent aluminum, 3.5 to 4.5 weight percent vanadium, 0.15 to 0.20 weight percent oxygen, 0.02 to 0.05 weight percent nitrogen, 0 to 0.3 weight percent iron, 0 to 0.08 weight percent carbon, 0 to 0.0125 weight percent hydrogen, and 0 to 0.005 weight percent yttrium (col. 2, lines 4-23). Chakrabarti et al. ('624) further disclose that the beta-transus temperature for this alloy would be 1825°F (col. 2, lines 30-47). Chakarabarti et al. ('624) disclose forging the titanium alloy; thereafter solution heat treating at a temperature 55°F to 85°F below the beta-transus temperature; thereafter air cooling, oil quenching, or water quenching; and thereafter aging within the temperature range of 915°F to 950°F (col. 2, line 48 – col. 4, line 28). Chakrabarti et al. ('624) do not specify cooling to room temperature. However, Chakrabarti et al. ('624) disclose that the cooling rate would be result-effective in achieving a desired toughness of a desired section size (col. 3, lines 2-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the cooling

rate such that a desired toughness and room temperature would be obtained at the end of quenching. See MPEP 2144.05 II.

Chakrabarti et al. ('624) disclose a method for fabricating a forged titanium alloy article of a desired section size as shown above, but Chakarabarti et al. ('624) do not specify that the thickness of the forged gas turbine engine component or final machining the forged gas turbine engine turbine component.

Titanium Metals Corporation ("Timet") discloses that sections greater than four inches do not effectively respond to solution treat and age type of heat treatments (pg. 2, Heat Treat Strategy).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method for fabricating a forged titanium alloy article, as disclosed by Chakrabarti et al. ('624), by limiting the section size to no greater than four inches, as disclosed by Timet, in order to ensure proper response to solution treatment and aging, as disclosed by Timet (pg. 2, Heat Treat Strategy).

Adinolfi et al. ('239) disclose that a forged Ti-6Al-4V part would be chemically milled to remove the contaminated alpha case before final machining (col. 1, lines 11-38 and col. 2, lines 54-66). Removal of the alpha case would optimize aerodynamic performance and aid in eliminating variations, defects, and discrepancies (col. 1, lines 11-25).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the method for fabricating a forged titanium alloy article, as disclosed by Chakrabarti et al. ('624) in view of Timet, by chemically removing the

contaminated alpha case and then performing final machining, as disclosed by Adinolfi et al. ('239), in order to optimize aerodynamic performance and aid in eliminating variations, defects, and discrepancies, as disclosed by Adinolfi et al. ('239) (col. 1, lines 11-25).

Still regarding claim 10, Chakrabarti et al. ('624) disclose wherein typical forgings would have yield strengths (0.2% offset) above about 140 ksi (col. 3, lines 41-52). Furthermore, the Examiner asserts that the alloy of Chakrabarti et al. ('624) in view of Timet and Adinolfi et al. ('239) would have the claimed yield strength at its centerline and below the surface because the alloy would have substantially the same composition and substantially the same processing. See MPEP 2112.01 I.

In regards to claims 3-4 and 12-13, Adinolfi et al. ('239) disclose wherein the compressor parts (which would include a compressor disk) would be included among the titanium alloy parts that would be subjected to chemical milling. However, based on the entire disclosures of Chakrabarti et al. ('624) and Adinolfi et al. ('239), it would have been obvious to one of ordinary skill in the art to apply the process of forging, solution heat treating, water quenching, aging, chemical milling and final machining to any gas turbine component to optimize aerodynamic performance and aid in the elimination of variations, defects and discrepancies.

In regards to claims 5 and 14, Chakrabarti et al. ('624) disclose that the solution heat treatment would occur for ½ hour to 1 hour (col. 2, line 66 – col. 3, line 2).

Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium

Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239), and further in view of the ASM Handbook Volume 4.

In regards to claims 6 and 15, Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239) disclose a method for fabricating a forged titanium alloy article to make gas turbine parts as shown above, but Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239) do not specify that quenching would be initiated within about 20 seconds of completing the step of solution heat treating.

The ASM Handbook Volume 4 discloses quenching after solution heat treating within 20 seconds to prevent the decomposition of the β phase (pg. 917, col. 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method for fabricating a forged titanium alloy article, as disclosed by Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239), by quenching within 20 seconds of the completion of solution heat treating, as disclosed by the ASM Handbook Volume 4, in order to prevent the decomposition of the β phase, as disclosed by the ASM Handbook Volume 4 (pg. 917,

col. 2).

Claims 7 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239), and further in view of the ASM Handbook Volume 4.

In regards to claims 7 and 16, Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239) disclose a method for fabricating a forged titanium alloy article to make gas turbine parts as shown above, but Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239) do not specify that aging would occur for at least about 4 hours.

The ASM Handbook Volume 4 discloses that aging times and temperatures would be result effective in achieving a desired strength (pg. 917, col. 3). See MPEP 2144.05 II.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method for fabricating a forged titanium alloy article, as disclosed by Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi

et al. (US 4,563,239), by applying any desired aging time, as disclosed by the ASM Handbook Volume 4, in order to achieve a desired strength, as disclosed by the ASM Handbook Volume 4 (pg. 917, col. 3).

The ASM Handbook Volume 4 also discloses solution heat treating at a temperature of about 70°F below the beta-transus temperature, water quenching, and aging for 2-8 hours at 995-1250°F in order to produce a microstructure that would be primary α, plus tempered α' or a β- α mixture (pg. 914, Table 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method for fabricating a forged titanium alloy article, as disclosed by Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239), by applying an aging time in the range of 2-8 hours, as disclosed by the ASM Handbook Volume 4, in order to achieve a microstructure that would be primary α, plus α' or a β- α mixture, as disclosed by the ASM Handbook Volume 4 (pg. 914, Table 1).

Claims 8-9 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239), and further in view of Bewlay (US 6,370,956).

Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the

Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239) disclose a method for fabricating a forged titanium alloy article to make gas turbine parts as shown above, but Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi et al. (US 4,563,239) do not specify that a titanium alloy article would be ultrasonically inspected after forging and before heat treating or final machining.

Bewlay ('956) discloses ultrasonically inspected samples. These samples include a conventional billet; a forged version of the conventional billet; a UFG billet (a conventional billet that has been forged into a shape) (col. 5, lines 30-43); and a forging of a UFG billet. The forged UFG billet would be characterized by press forging at 900°C (heat treatment) (col. 6, lines 1-14). Bewlay ('956) further discloses that ultrasonic inspection detects flaws, grains, imperfections and other microstructural characteristics and the use of ultrasonic inspection on turbine components (col. 1, lines 5-20 and col. 4, lines 32-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply ultrasonic inspection to a titanium alloy between the stages of fabrication, as disclosed by Bewlay ('956), while conducting the method for fabricating a forged titanium alloy article, as disclosed by Chakrabarti et al. (US 4,898,624) in view of the website disclosure of the Titanium Metals Corporation found at www.timet.com/metal64frame.html as archived by www.web.archive.org and Andinolfi

et al. (US 4,563,239), in order to detect flaws, grains, imperfections, and other microstructural characteristics, as disclosed by Bewlay ('956) because Bewlay ('956) teaches using ultrasonic inspection on titanium alloy turbine components (col. 1, lines 5-20 and col. 4, lines 32-47).

Response to Arguments

First, the Applicant primarily argues that Timet does not deal with forged articles. In response, the Examiner notes that Timet does not dissuade the use of forged articles.

Second, the Applicant primarily argues that (1) Bewlay ('956) teaches ultrasonic inspecting a material that is made of a completely different alloy type (Ti6242) and (2) there is no indication that Bewlay ('956) teaches ultrasonic inspection after the step of forging the workpiece and before the step of heat treating. In response to argument (1), the Examiner notes that Bewlay ('956) teaches ultrasonic inspection of turbine components that would be made of titanium alloys (col. 4, lines 32-47). Therefore, it would be expected that that the ultrasonic inspection would not be limited to only Ti6242 alloys, but would also be applicable to other titanium alloys including Ti64 alloys. In response (2) see the rejection of claims 8-9 and 17-18 above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessee Roe whose telephone number is (571) 272-5938. The examiner can normally be reached on Monday-Friday 7:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JR

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700